

CLAIMS**We claim:**

1. A method of increasing throughput of a server capable of servicing at least one TCP/IP connection with a client, the server creating a TCP/IP Transmission Control
5 Block (TCB) stored in non-paged pool (NPP) memory containing information required to identify and to service the client connection, comprising the steps of:

closing a TCP/IP connection;

excluding information from the TCB not required to identify the client connection to form a timed-wait state TCB (TWTCB) for a time-wait period; and

10 releasing the NPP memory containing the information required to service the client connection.

2. The method of claim 1, wherein the step of excluding comprises the step of copying the information required to identify the client connection to form the TWTCB.

15 3. The method of claim 2, wherein the step of releasing the NPP memory containing the information required to service the client connection includes the step of releasing the NPP memory of the TCB required to identify the client connection.

20 4. The method of claim 1, wherein the step of excluding information not required to identify the client connection to form a TWTCB comprises the step of maintaining a minimum of information necessary to avoid late-routed packets forming new connections on the server.

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5. The method of claim 1, wherein the step of excluding information not required to identify the client connection to form a TWTCB comprises the step of establishing a TWTCB of the following structure:

```

5      struct TWTCB {
      #ifdef DEBUG
          ulong      twtcb_sig;
      #endif
10      struct TWTCB  *twtcb_next;
          IPAddr      twtcb_daddr;    // Destination IP address.
          ushort      twtcb_dport;    // Destination port.
          ushort      twtcb_sport;    // Source port.
          uint         twtcb_partition;
15      ushort        twtcb_delta;
          ushort        twtcb_rexmittimer;
          Queue         twtcb_TWQueue; // Place to hold all the timed_waits
          uint         twtcb_flags;
          IPAddr        twtcb_saddr;   // Source IP address.
20      SeqNum         twtcb_senduna;
          #if 0 // TRIM_TWTCBREMOVE
              SeqNum      twtcb_sendnext;
          #else
              struct TWTCB *twtcb_prev;
25      #endif
          SeqNum        twtcb_rcvnext;
          uint          twtcb_phxsum;  // Precomputed pseudo-header xsum.
          DEFINE_LOCK_STRUCTURE(twtcb_lock)

30      //ulong          twtcb_refcnt;
          //SeqNum       twtcb_sendmax;
          //uchar         twtcb_state;  // State of this TCB.
          //RouteCacheEntry *twtcb_rce; // RCE for this connection.
      };

```

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6. The method of claim 1, wherein the step of excluding information not required to identify the client connection to form a TWTCB comprises the step of establishing a TWTCB of the following structure:

```

struct TWTCB {

#ifdef DEBUG
    5      ulong   twtcb_sig;
#endif
    struct TWTCB *twtcb_next;
    IPAddr twtcb_daddr;      // Destination IP address.
    ushort twtcb_dport;      // Destination port.
    10      ushort twtcb_sport;    // Source port.
    ushort twtcb_delta;
    ushort twtcb_rexmittimer;
    IPAddr twtcb_saddr;      // Source IP address.

    //ulong twtcb_refcnt;
    15      //SeqNum twtcb_sendmax;
    //uchar twtcb_state;      // State of this TCB.
    //RouteCacheEntry *twtcb_rce;    // RCE for this connection.

};

```

7. The method of claim 1, wherein the step of excluding information not required to identify the client connection comprises the step of forming a TWTCB that occupies less memory than the TCB.

8. The method of claim 7, wherein the step of forming a TWTCB that occupies less memory than the TCB comprises the step of forming a TWTCB that occupies approximately 96 bytes of memory.

9. The method of claim 7, wherein the step of forming a TWTCB that occupies less memory than the TCB comprises the step of forming a TWTCB that occupies approximately 64 bytes of memory.

11. A method for increasing the throughput of a server capable of servicing at least one TCP/IP connection, the server establishing a TCP/IP Transmission Control Block (TCB) of a size and containing information sufficient to identify and service the connection, comprising the steps of:

forming a Timed-Wait TCB (TWTCB) of a size less than the TCB; and
releasing the TCB for use by the server.

13. The method of claim 12, wherein the TCB occupies approximately 440 bytes of memory, and wherein the step of forming a TWTCB comprises the step of forming a TWTCB that occupies approximately 206 bytes of memory.

14. The method of claim 12, wherein the TCB occupies approximately 440 bytes of memory, and wherein the step of forming a TWTCB comprises the step of forming a TWTCB that occupies approximately 32 bytes of memory.

15. The method of claim 11, wherein the step of forming a TWTCB comprises the step of forming a TWTCB having the following structure:

```

struct TWTCB {
#ifdef DEBUG
    10      ulong      twtcb_sig;
#endif
    struct TWTCB  *twtcb_next;
    IPAddr      twtcb_daddr;    // Destination IP address.
    15      ushort    twtcb_dport;    // Destination port.
    ushort      twtcb_sport;    // Source port.
    uint        twtcb_partition;
    ushort      twtcb_delta;
    ushort      twtcb_rexmittimer;
    Queue       twtcb_TWQueue; // Place to hold all the timed_waits
    20      uint      twtcb_flags;
    IPAddr      twtcb_saddr;    // Source IP address.
    SeqNum      twtcb_senduna;
#ifdef TRIM_TWTCBREMOVE
    SeqNum      twtcb_sendnext;
    25      #else
        struct TWTCB  *twtcb_prev;
    #endif
    SeqNum      twtcb_rcvnext;
    uint        twtcb_phxsum;    // Precomputed pseudo-header xsum.
    30      DEFINE_LOCK_STRUCTURE(twtcb_lock)

    //ulong      twtcb_refcnt;
    //SeqNum      twtcb_sendmax;
    //uchar      twtcb_state;    // State of this TCB.
    35      //RouteCacheEntry *twtcb_rce;    // RCE for this connection.
};

```

16. The method of claim 11, wherein the step of forming a TWTCB comprises the step of forming a TWTCB having the following structure:

```

struct TWTCB {
5      #ifdef DEBUG
        ulong twtcb_sig;
      #endif
        struct TWTCB *twtcb_next;
        IPAddr twtcb_daddr;      // Destination IP address.
10      ushort twtcb_dport;      // Destination port.
        ushort twtcb_sport;      // Source port.
        ushort twtcb_delta;
        ushort twtcb_rexmittimer;
        IPAddr twtcb_saddr;      // Source IP address.
15
        //ulong twtcb_refcnt;
        //SeqNum twtcb_sendmax;
        //uchar twtcb_state;      // State of this TCB.
        //RouteCacheEntry *twtcb_rce;      // RCE for this connection.
20
};

```

17. The method of claim 11, wherein the step of forming a TWTCB comprises the step of copying a portion of the information of the TCB, the portion of information being insufficient to service the TCP/IP connection.

18. A computer readable medium having computer-executable instructions for performing steps, comprising:

closing a TCP/IP connection;

30 copying less than all information stored in a TCP/IP Transmission Control Block (TCB) into a Timed-Wait TCB (TWTCB); and

maintaining the TWTCB for a timed-wait period to avoid late-routed packets from establishing a new connection with a server.

19. The computer-readable medium of claim 18, wherein the step of copying
5 less than all the information stored in a TCB into a TWTCB comprises the step of copying information sufficient to uniquely identify the TCP/IP connection.

20. The computer-readable medium of claim 18, further comprising the step of releasing memory used to store the TCB for use by the server after the step of copying
10 less than all of the information stored in the TCB into a TWTCB.

21. The computer-readable medium of claim 18, wherein the step of copying
less than all the information stored in a TCB into a TWTCB results in a structure for the TWTCB that fits on one cache line.

22. A computer-readable medium having stored thereon a data structure,
consisting essentially of:

```

struct TWTCB {
    #ifdef DEBUG
        ulong      twtcb_sig;
    #endif
    struct TWTCB  *twtcb_next;
    IPAddr       twtcb_daddr;    // Destination IP address.
    ushort       twtcb_dport;    // Destination port.
    ushort       twtcb_sport;    // Source port.
    uint         twtcb_partition;
    ushort       twtcb_delta;
    ushort       twtcb_rexmittimer;

```

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